

Environmental Education in Urban Systems: **An Exploration in Research and Practice**



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INTRODUCTION

What are urban social-ecological systems and why are they important?

Cities are part of most people's experience. More than half of the world's population (Brunn et al. 2003) and nearly 80% of the population of the United States (Parlange 1998) live in urban areas. Many who do not live in cities work in or visit them.

Cities also have a profound impact on the environment. Simply providing room for so many people to live together requires extensive environmental alterations. Housing, places to work and shop, transportation systems, and utilities all affect the environment. The byproducts of people's day-to-day activities – carbon emissions, solid waste, and more – affect the environment, too. You can't look far in a city without seeing a human footprint – and a large one!

But many other living things share cities with people, too. From street trees to vacant lots to community gardens to major urban parks, cities are filled with plants and animals of one sort or another. Streams, rivers, and lakes support aquatic life. Cities are truly ecosystems – communities of interacting organisms and their environment. Cities are shared by people, plants, and other animals.

When considering the quality of the environment, urban ecosystems typically have been viewed from a deficit-based perspective with a focus on what is lacking rather than what is valuable. Urban systems often perpetuate unsustainable notions of human exemptionalism and exceptionalism that reinforce facile dichotomies about "people" being separate from

"nature" and create additional alienation of people from their ecological homes in the biosphere (Dunlap 1980, Dunlap and Catton 1994, Vitousek et al. 1997, Williams 2007). But Light (2001) and others have questioned whether urban landscapes must be seen as the "source of all environmental ills." Indeed, many ecologists have come to recognize the pitfalls in trying to understand ecosystems as something separate from people. Rather, the tendency to view ecosystems, including urban ecosystems, as linked social-ecological systems has been increasing (Alberti 2008). Seen from this perspective, cities are not places where people live and work with patches of nature mixed in. They are yet another place in which people and the rest of nature are inextricably interwoven, continually influencing each other – sometimes for the worse, but many times for the better.

Why is urban environmental education important to consider?

Because human interaction with ecosystem elements in cities can lead to positive and negative effects, the question of what makes a healthy urban social-ecological system – a system in which both people and the rest of nature can thrive – is important. Conservationist Aldo Leopold was one of our most articulate spokesperson's about the need to view the land on which we live as an entity with which we need to strive to maintain a harmonious relationship. He articulated this concept in his statement of the "land ethic" – "A thing is right if it tends to preserve the stability, integrity, and beauty of the biotic community. It is wrong if it tends otherwise" (Leopold 1949).

Leopold's land ethic has had a profound influence on modern environmental thinking (Callicott 1987, Leopold 2004) in which the health of ecosystems is a critical concern. More specifically, Leopold's thinking has influenced the philosophy and practice of environmental education (Pembleton et al. 2006, Reckard and Kobylecky 2006, Stevenson 2007). Many environmental education programs attempt to promote understanding of and appreciation for the natural environment and the myriad of interrelationships that exist within it as a way to promote healthier systems and more harmonious relationships.

But how well does an environmental education practice rooted in an appreciation of biotic communities and ecosystems

apply to urban social-ecological systems? To systems in which biotic communities have been so heavily altered by people? What are the characteristics that contribute to the health, and resilience, of urban systems? Some of these characteristics, species diversity, healthy populations of species, etc., might be very similar to those considered in discussions of any ecosystems. Others, however, would extend beyond biotic components and relationships to capture some of the characteristics of the social systems with which they interrelate.

A growing number of environmental educators have become interested in *urban* environmental education practice – in practice that is specifically tailored to the unique needs and characteristics of urban

Box 1: The Importance of Urban Environmental Education (Naima Freitas, City-As-School High School, New York City)

Growing up in New York City, I was never really conscious of nature. It was only after leaving the city to go to college that I became aware that we shared, depended upon, and impacted the environment tremendously. It was as if a veil was lifted! When I returned to the city I was amazed at the diversity of life and the intricate relationships between the organisms in our urban environment. I was inspired to become a teacher, and for the last twelve years I have worked at City-As-School High School exploring those relationships with my students.

I know that urban environmental education is important because building an understanding of the biological, chemical and physical urban environment helps students to understand global environmental dynamics. Without understanding and appreciating the local rivers, the urban forest, the unique geography, and the impact that humans have, it is nearly impossible for students to grasp the importance of our waterways, oceans, soils and biomes in general. This local-global connection is important for students to forge wherever they live, but I believe it is even more important in our cities.

Here in New York City students can begin to see how social and historical developments have impacted the environment. When we study the Hudson River, students can see how the diversity of species has been limited by human actions. They can also appreciate how we are connected to places that seem far away. While gardening, students can begin to understand the importance of their plant choices as they witness the migration of the monarch butterflies and their use of garden plants. While growing food in our organic community farm, students who never previously thought about how their food was produced learn to appreciate why fresh water, good soil and air, and a diversity of pollinators and beneficial insects are crucial for our very sustenance.

Examples like these illustrate how urban environmental education provides the connection between our increasingly urban population and the other animals, plants, land, air, water that sustain them. When students are familiar with and feel responsible toward the natural areas around them their lives are enriched. They feel curiosity and wonder and develop a pride and sense of ownership that many teenagers are lacking -- building community and activism in the process. To me this is what education should strive for and our urban environment is a resource to spark this.

social-ecological systems. This exploration is intended to stimulate thoughtful discussion about just what those unique needs and characteristics are.

This exploration is a collaborative effort of environmental education researchers and practitioners. By combining research with a synthesis of the perspectives and practices of environmental educators, we flesh out ideas intended to help environmental educators working in cities. The exploration is organized into three parts.

In the first part, we report the results of research in which we documented the perspectives of urban environmental educators – educators who focus on cities, and the people who live in them, in their work. In particular, we explored what urban environmental educators thought was needed for healthy cities. Because of their interest and experience in urban areas and the environment, we believed urban environmental educators were in a good position to help us expand our thinking from what is needed for healthy ecosystems to what is needed for healthy social-ecological systems. What combination of ecological and social factors “preserve the stability, integrity, and beauty” of cities? An understanding of what cities would look like in an ideal world is a critical underpinning of urban environmental education practice that will help move us toward that ideal world. This research had two components:

- We conducted interviews of 20 educators interested in urban environmental education. Interviews consisted of a series of open-ended questions about the characteristics of healthy cities and allow us to report, in educators’ own words, what they believe is needed for well-functioning urban social-ecological systems – considering the natural, social, and built components of these systems.

- We conducted an internet survey of members of the North American Association for Environmental Education (NAAEE) – a professional association of environmental educators. We focused in particular on NAAEE members who had a high level of interest in urban environmental education. Like the interviews, the survey consisted of questions about the characteristics of healthy cities. Respondents were asked to rate how much of a contribution each of 47 characteristics of cities makes to “healthy urban environments.” During analysis, we were able to group these characteristics into 13 categories.

In the second part of this exploration, we flesh out a series of specific recommendations about urban environmental education. These recommendations grew out of a workshop in which we shared with a group of 10 urban environmental practitioners the research results about healthy urban social-ecological systems from the first part of the study, and the educators shared stories about effective practice. They are, therefore, a synthesis of what research and practice tell us about setting objectives for urban environmental education programs that are both important and feasible and how to design programs to achieve these objectives.

Interspersed throughout the exploration, you will find the stories of specific urban environmental education programs, describing how environmental educators carry out their work in cities. What do they try to accomplish? How do they go about it? What are the keys to their success? In telling these stories, we draw connections between the experience of environmental educators, the characteristics of cities that our research told us were important, and our recommendations for practice.

Research Results: Characteristics of Healthy Urban Environments

What makes a healthy urban environment? In talking with us at length based on their own experience with cities, the 20 urban environmental educators we interviewed helped us identify 14 different characteristics needed for urban environments to be healthy (Table 1). We grouped these characteristics into 5 basic categories:

- Characteristics of the Environment – features of the biophysical and built environment, such as land, water, air, and buildings.
- Environmental Influences on People – ways that people are affected by their environment.
- People's Relationship to the Environment – how people understand or interact with their environment.
- Characteristics of People – features of human communities and interactions therein.
- Human Assets – resources or capacities that people have.

One thing you should notice right away is that when we talk about a healthy urban environment, we're talking about a lot more than land, water, plants, and animals – the kinds of things that are usually discussed in relation to ecosystems. A healthy urban environment is about people, too. It is truly a social-ecological system. If you scan our list of categories from top to bottom, you'll see that they capture the characteristics of both the biophysical and built environment (toward the top of the list) and people (toward the bottom of the list).

To help you get a feel for these characteristics and how environmental educators think about the role they play in healthy cities, we describe each of the 14 characteristics of healthy urban environments in educators' own words (as reported to us during our interviews).

Characteristics of the Environment

Healthy urban systems depend in part on the biophysical and built environment. This includes the things people normally think about when they think about ecosystems – plants and animals and the land and water on which they depend. But it also includes the built environment – the environmental structures created by people. Educators identified two key characteristics of the biophysical and built environment – green space and aesthetics.

Green Space

Green space was one of the characteristics of urban systems educators mentioned most frequently as being important.

In my ideal urban community ... a big green space would be in the center of it, and it would be ... surrounded by green space.

Natural green space with native plants and animals were considered important in cities:

I would like to see urban communities that have urban forests. A lot of trees that are planted and the chance for wildlife to move ... is really important... I don't like to see just a bunch of concrete. If they can find some way to plant more plants – and native plants ... then that encourages a lot of the native wildlife... People get a lot more birds that way and butterflies and things like that.

But highly managed green spaces, such as parks and community gardens, were equally important.

I think an ideal urban community needs to have community gardens.

Educators frequently mentioned the benefits that green space could provide people:

I think it all comes down to ... green spaces and the benefits of green spaces for the community... I've seen that firsthand.

Table 1. Characteristics of healthy urban social-ecological systems.

Characteristic	Definition	Number of Times Mentioned in Interviews
Characteristics of the Environment		
Green Space	Vegetated open space with organisms other than people.	77
Aesthetics	Characteristics of the social-ecological system that are aesthetically appealing.	18
Environmental Influences on People		
Health and Safety	Conditions within the social and built components of the social-ecological system that promote the health and safety of people.	71
Clean Environment	Absence of contaminants within the physical components of the social-ecological system	18
People's Relationship to the Environment		
Environmental Activities	Exposure to social-ecological system components or participation in activities involving engagement with those components	68
Community Ownership	A sense of responsibility toward the local social-ecological system and a belief that one has the ability to influence its quality, including advocacy on behalf of the social-ecological system	38
Environmental Awareness	Awareness of and appreciation for the local social-ecological system and recognition of one's connections to it.	35
Environmentally Friendly Lifestyles	Taking actions to protect the social-ecological system by minimizing resource use and waste and relying more on local resources.	12
Planning Process	Efforts to consider how human actions will influence the quality of the environment in advance	9
Characteristics of People		
Social Support	Positive social interactions with other people or fostering the conditions that lead to those interactions	62
Community Organizations	Organizations that improve the quality of the social-ecological system	33
Social Diversity	Engagement of diverse individuals and groups with the social-ecological system	20
Human Assets		
Resources	Economic, human, and other resources available to support desirable activities and processes in the social-ecological system	33
Community Infrastructure	Characteristics of the built environment that support desirable activities and processes in the social-ecological system	33

Green spaces provided opportunities for outdoor activities and places for people to gather:

Local parks with different types of activities ... Playgrounds and sports facilities.

Green spaces are places for people to ... gather.

Educators believed that green space was necessary for the physical and mental health of urban residents:

Access to green space is really important in urban areas for mental health. There were some interesting studies I saw at a Chicago project that looked at violence among people in housing projects that could see trees from their window and people that couldn't, and it was drastically different.



Green space, aesthetics, and influences of the environment are all part of a healthy urban system. Photo: Keith G. Tidball

But for green space to provide these benefits, it had to be accessible:

I guess the perfect community would have plenty of green space and pocket parks within a reasonable walking distance from people's homes. So they don't have to get in the car and drive there.

It also had to be safe enough for people to feel comfortable using it:

The communities that I've worked with ... it's been most problematic ... when they have not had outdoor spaces that they could

feel safe in. That's a problem for the parents... It's a problem for the kids who start getting completely disconnected with the outdoors.

Aesthetics

Although less tangible than green space, some educators also argued that the "beauty" of urban communities was important. One reason the beauty of urban communities was important is that it encouraged people to spend time outside:

It just makes the area prettier and more inviting to ... be there.

Beauty is interrelated with the investment of energy residents make in their community:

I was ... walking on my street the other day and I saw that ... somebody was ... either evicted or had to move out really suddenly. And there were all these books that were ... spilling out from their stoop onto the sidewalk... Then I walked by it today and ... it's all cleaned up. And what it made me think was ... I wonder if somebody ... in the community ... enforced that ... knocked on the door and said: "Hey this is looking quite disgraceful... You really need to clean this up."

Environmental Influences on People

As is probably obvious already, one reason that educators thought that the biophysical and built environment was important was because people are affected by that environment in tangible ways. They frequently mentioned residents' health and safety as a key part of healthy urban systems. One particular influence on health and safety was environmental pollution.

Health and Safety

Having an urban environment in which people could live safe and healthy lives was one of the topics that was discussed most frequently during our interviews. This discussion related to the more general concern that urban residents should be able to meet their basic needs in the cities in which they lived:

What I learned is that other priorities will always come first. And they are home, shelter, food, safety for family and children, education, and employment.

The parents want a safe environment. A safe place and safe activities and a better future for their kids.

Health and safety were closely connected with other characteristics of urban areas. As discussed previously, both physical and mental health benefitted from the presence of green space:

I think there's a study showing that people who are near trees or ... can see trees out of their windows have lower heart rates ... So on the physical level I think that's really important.

Clean Environment

One specific urban influence on health and safety was a clean environment free from pollution.

Air quality, water quality inside cities is a huge deal... You run into serious issues when you start concentrating people ... You've got some major ecological issues with waste disposal, with keeping everybody supplied with good clean water. And you've got sewer systems... You know [it] has to all go somewhere... Around here ... [it] ends up in the river.

Pollution can directly affect human health.

We see big pockets of asthma and other things that are air quality related.

The presence of green space, however, can ameliorate pollution and some of its effects on people.

The [high] air pollution areas I think definitely could use more trees ... to help clean some of the air... Using the natural ability of trees to clean some of the air ... will be helpful, especially in the areas with ... high child asthma rates.

People's Relationship to the Environment

It's not simply how the environment influences people that is important in cities, however. Educators discussed the ways that people perceived and related to their

environment as essential to healthy urban systems. Five specific characteristics were discussed: environmental activities, community ownership, environmental awareness, environmentally friendly lifestyles, and planning processes.

Environmental Activities

Educators believed that people are actively engaged with their environment in healthy urban systems. People need to get outside. The necessity of green space to environmental activities is apparent:

Green space is, I think, extremely important... In the Bronx on Pelham Parkway (which is an old divided highway) ... in between the two directions of traffic you have a nice swath of green, which is probably the width of two or three traffic lanes... On a nice summer day everyone is out there using that area, whether they're having picnics, big family gatherings or it's just ... a single



Health and a feeling of safety are important parts of people's relationship with the environment. Photo: Keith G. Tidball

person lying in the sun. Or it's a group of kids playing ball or Frisbee. They use those green spaces astonishingly and routinely.

Gardening is one particular important type of environmental activity:

If everybody had a rooftop garden... it might be a different environment.

But simply engaging with nature is also valuable:

I think that when people are, first of all, able

to observe and appreciate and benefit from nature, that their quality of life is simply higher... Just the shade that's provided by large trees or the ... benefit of interacting with a squirrel in your street.

We have discussed the importance of "health and safety" in urban communities already. Health and safety considerations have a direct effect on environmental activities. People won't use green space unless it is safe:

There have been communities that I've visited where the green spaces aren't used because of danger. And then it doesn't become what it should be.

In other cases, people may use green spaces, but if that space is polluted, it can be unsafe:

It's very polluted and dangerous... You can't swim in the Bronx River. We still do see some people swimming in the Bronx River, and we tell them to stop. We can't always get them to stop, but we try to educate people about the dangers of swimming. It is simply not safe to swim in.

Community Ownership

Taking part in environmental activities is not enough, however. Urban residents must also feel a sense of responsibility toward the local environment.

The local community would be really involved in what happens in the community. So the parks, for instance, would really be taken care of by the community. Right now it's taken care of by the Parks Department and that's fine. The Parks Department does a fine job at it, but we come in on a Monday morning after a busy weekend and the park gets trashed. So the community would really take care of the resources that they have here in terms of parks and the river.

When urban residents feel a sense of responsibility toward their environment, they are more likely to act on its behalf.

A community ... would value [the environment] and come out to support anything that adds to that and come out and oppose anything that takes away from that... We had an attempt to have some kind of coal-fired energy plant west of town, and our

community came out two years ago and stopped it. That was considered a success... A community that is proactive for all those things... clean water, clean air.

If you respect [nature] and understand it, you want to take care of it.

Environmental Awareness

Residents' awareness and appreciation of their environment provides a foundation for a healthy relationship to it and advocacy on its behalf. A lack of awareness, therefore, is a problem:

Many community members who come here don't know about the Bronx River at all. They've never thought about it. They may have lived in the Bronx their whole life but never once thought about the river. Maybe they know it's there but their ideas about it are very negative.

One aspect of environmental awareness is understanding how you are connected to the environment:

Where does my food come from?... Where do my kids go?... How does that energy get into my house and how is it generated?... Those are equally important, ultimately, for someone living in a randomly chosen spot in New York State, whether it be urban or rural... That idea of the importance of sense of place and community and ... ecological literacy.

One reason green spaces were considered so important in urban areas is that they provide the opportunity for residents to develop this awareness and appreciation:

I think those have an immense value to the mindset of the community... their ties to the land, their respect for the land, their conservation ethics... Because they have those places that they can see and feel and touch and in so doing they develop that respect for it.

Environmentally Friendly Lifestyles

The concentration of people in cities has an enormous impact on the environment.

We are just creating such waste... Our whole environment is just completely altered by our use of energy and everything else.

For that reason, residents' lifestyle choices are particularly important in healthy urban systems. People's individual decisions can reduce negative environmental effects.

An ability to get everywhere on foot or on a bike or with mass transit to me would be ideal ... less driving.

I would say as much ... green technology as possible... [It has] huge impacts on urban communities. If more homes had ... solar panels on the rooftops ... they're not as dependent on a grid.

In fact, urban communities have some advantages when it comes to individuals minimizing their impacts on the environment.

Our kids tend to have much lower carbon footprints, for example, than kids in suburban areas. Most of them don't even have cars. When we're talking about climate change and energy, we ... talk to them about the benefits of living in urban areas. Urban areas aren't new. The Roman Empire had cities. There are benefits of living in dense populations ... such as the fact that kids

who live in a lot of the high rises ... when you look at the heating ... there are smaller abodes than some of the suburban things.

Planning Process

A few educators noted the importance of proactive community thinking about the environment – or environmental planning – to healthy urban communities. These individuals argued that planning was necessary to prevent human activities from damaging the environment:

I think every community needs to be thinking about what's our community going to look like in 100 years... The ideal community [has] sustainability on the mind when they ... do their planning. They're not just looking to add another subdivision... It goes back to ... sustainability.

My ideal urban area would be one that is utilizing the land wisely ... doing what we call conservation-based planning ... where instead of taking a whole farm and putting 100 units, taking a farm and putting 10 units on it and keeping some as a nature preserve.

Box 2: Forging a Connection to the Environment (Chrissy Word, Rocking the Boat, New York City)

Unless one has regular access to a resource such as a river, there will be no meaningful connection to it. Many of my students, upon arrival to Rocking the Boat's riverside facility, don't know that the Bronx River exists. If they do, it's likely because they have recently learned about it in the classroom or they've known about it previously and have a negative image of it. Once they do have access however, the impact is noticeable.

On their first trip to Rocking the Boat, I ask students to rate the river on a scale of one to ten (ten being the best possible condition). Most of them give it a two or three. After their experiences on the water, almost all of them change their minds. This is because of the things they do there. Using an assortment of nets, they catch and observe aquatic organisms – usually a good variety; they do chemical tests and learn about how these are like taking the vital signs of the river; and they use binoculars to observe birds and other wildlife. In our afterschool on-water and service learning programs, students go steps further and, as citizen scientists, collect valuable data and perform restoration of riverine habitats alongside scientists and technicians. All of them get out in the fresh, salty air and row and have fun.

Having fun is the most important ingredient for developing river stewards. There are still many problems facing the Bronx River and one day the students should learn about them. But to start with, they need to enjoy themselves and feel their own presence is needed there. They have to experience and learn to love the things that make the river such a special place. The river needs their advocacy and that need will still be present in years to come when their fond memories – or current love – of the river informs their actions and the way they vote.

Characteristics of People

It is not surprising that environmental educators think people's relationship to the environment is important in healthy urban systems. However, they also argued that other characteristics of people are important, too – even those without a direct connection to the natural environment.

Social Support

Many educators argued that social support was important in cities – people supporting each other.

When I think of a healthy community I think about neighbors knowing each other and supporting each other and bartering things and doing things for each other ... so having a strong network of people and relationships.

These positive interactions provide a variety of benefits. They directly contributed to urban residents' health and safety:

Having your neighbors watching your house when you're gone or ... when ... something's amiss... If something happens ... or somebody gets sick or injured or there's an accident ... somebody's there to step up and address the situation. And there's huge benefits there as far as safety, and I think that helps play into people's psychological health, knowing that they're safe, that there are people watching out for them.

But social support is interconnected with environmental activities, too. Environmental activities can build connections between people. And connections between people can create opportunities for environmental activities.

There are communities that come together and create art and create green spaces where they feel happy and together and can farm or ... create beautiful gardens based on both food and beauty. Where they're coming together to teach each other about gardening, about birds, about the environment. To teach each other about their expertise. To teach each other about art and come together for events where there's food and fun and a lot of support.

Community Organizations

Closely connected to social support is the idea that healthy urban systems need

strong community organizations.

I think that having strong community-based institutions like social institutions, churches and [the] business community are really important.

These organizations provide a variety of concrete benefits for urban residents, which can do much to strengthen their communities. They are closely linked to the health and safety of urban residents.

Many of the communities ... were fighting against crime, against street gangs, and losing their kids to street gangs. They were fighting ... against poverty. The majority of the households ... were [earning] \$5,000 or less a year... [with] undocumented parents and the fear of being deported. And fear of police sometimes, fear of safety for their children, etc... and also illiteracy... [A difficulty for these families] was navigating the system. Really feeling at a complete loss in terms of how to get the kids to school, how to send them to college – how do you know if that was even a possibility? How to navigate the legal system, how to navigate the social service system. And when they had an advocacy organization that they could completely trust and work with, an advocacy organization that was helping them as individuals, as parents, but also helping their children and keeping them safe and organizing them in activities, where they felt that their kids were really receiving a great education or at least learning. Parents felt very, very comforted by this.

Social Diversity

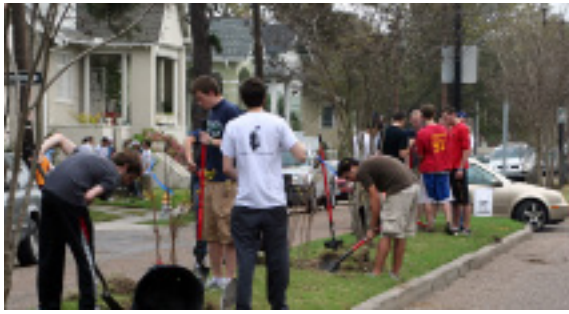
In addition to being characterized by strong relationships and organizations, healthy communities were perceived as needing a diversity of people.

Diversity ... an ecosystem is only successful if there's lots of different types of organisms on all different types of levels. And that's the same for an urban community, and the more diverse it is the richer it is.

Diversity in communities strengthens communities by enriching ideas under discussion:

What would strengthen community [is] an intergenerational appreciation of work...

Little people are important... Really old people are important. Everybody's got ideas.



Social support, community organization, and diversity are all important to build connections through environmental activities, as demonstrated by these college students replanting an entire street with trees after Hurricane Katrina in New Orleans. Photo: Keith G. Tidball

Human Assets

The ability of people to support each other and the environment in urban communities depends in part on the assets they have at their disposal. Two types of assets were noted by the educators we interviewed – resources and community infrastructure.

Resources

Some of the key resources in urban systems are economic.

I guess I would say a healthy urban environment shouldn't have pockets of extreme poverty in the best of all possible worlds. I know that's a hard one. I think that as much as possible ... eliminating intense large pockets of extreme poverty make for a healthier urban environment.

Economics is a huge part of it. I would say the driving force is economics.

The availability of resources has a direct bearing on people's abilities to meet their basic needs. Communities with limited resources are much less likely to be able to promote the health and safety of their residents:

For some of our disenfranchised urban poor neighborhoods, it's very hard to say that your needs regarding health are being met when you have disproportionately placed waste facilities nearby. When you have higher numbers of fast food chains near you, how do you eat healthy?... When you have a

park that's within walking distance of you, or when you get air that's filtered through the trees ... you're going to have a much better chance of saying, "My needs are being met" than in some of our poorer neighborhoods where you ... disproportionately find higher levels of obesity ... but much less access to healthy foods ... and higher rates of asthma because the pollution rates are so much higher ... and because there are fewer trees and parks. I think a lot of it comes down to access and economics.

Resources also influence how much attention can be devoted to protecting the environment:

Without [basic needs met] ... you can't talk about ... the environment. I've got to get from here to the subway. I've got to drop my kid off at school first. I need to somehow get home and make dinner... It's things like that that help me understand that we can't pretend to think that this is important for families and individuals having limited resources and living in very challenging homes and neighborhoods.

Community Infrastructure

A specific type of resource is the infrastructure, or built environment, of urban communities. Educators frequently discussed the importance of transportation systems and recreational facilities to urban communities:

I think having a good infrastructure like we talked about ... having your community laid out so things are accessible, so traffic isn't a nightmare.

We also have some indoor facilities that other smaller towns might not. We have wonderful soccer facilities. And when you build those fields you also build buildings to have meetings in and you build picnic shelters with bathrooms.

Healthy Urban Environments

The complete set of characteristics of healthy urban social-ecological systems that educators identified for us is provided in Table 1. One measure of the importance of these characteristics to healthy urban environments is how frequently they were mentioned during the interviews. Four

characteristics were mentioned particularly frequently – green space, health and safety, environmental activities, and social support.

Two key insights emerge from these interviews:

- When discussing healthy urban social-ecological systems, the social components are equally as important as the ecological components. Social characteristics were mentioned as frequently as ecological characteristics. Characteristics of systems like social support and health and safety don't get discussed very frequently when talking about ecosystems, but they are important in urban social-ecological systems.
- The social and the ecological components are interrelated. As the interview excerpts attest, the social and the ecological can have profound effects on each other. For example, Figure 1 depicts that the quality of green space depends on a sense of community ownership of that space (leading to people who take care of it). Community ownership of green space is built in part by people having positive experiences outdoors. To have positive experiences outdoors, however, people need to feel safe in outdoor spaces. The quality of urban green spaces, therefore, depends indirectly on people feeling safe in cities. Other connections also exist between these components. The presence of green

**Box 3: Linking Youth Development with Environmental Conservation
(Brigitte Griswold, The Nature Conservancy, New York City)**

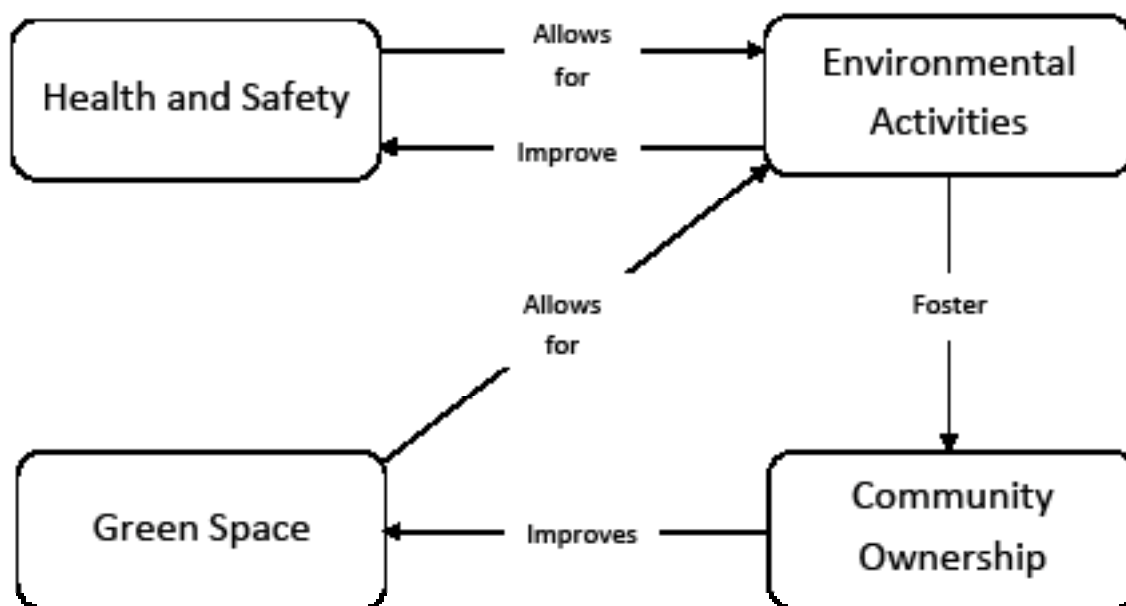
Since 1995, The Nature Conservancy's Leaders in Environmental Action for the Future Program (LEAF) has partnered with urban environmental high schools to provide students with opportunities to live, work, learn, and play in the natural world. The program marries The Nature Conservancy's scientific expertise and natural areas with lessons learned in green schools to provide students with the web of mentors, teachers, and peers that is fundamental to youth development programs.

Students are divided into teams of four and paired with professional mentors for a four-week summer field season. They work alongside Conservancy scientists to protect and restore habitat and save endangered species while learning about careers in conservation. They also visit colleges and enjoy activities such as camping, kayaking, and swimming. The program builds awareness of career possibilities, self confidence, independence, work skills, conservation literacy and a love of the outdoors. Over 30% of alumni have pursued environmental career paths and over 50% currently volunteer for environmental causes.

This success is directly linked to deliberate efforts to combine social and ecological components into the Program's design. LEAF integrates the principles of positive youth development (i.e. close relationships with caring adults, high expectations, engaging activities, opportunities to make a difference, and continuity of support) with extended time in nature to ensure a holistic experience for youth participants. The resulting model emphasizes both the social factors that contribute to children's well being and the ecological factors that contribute to the health of the natural spaces on which we depend.

Without social supports in place, a child's outdoor experiences may not be positive, and that can directly undermine the ultimate goal of many well intentioned environmental education programs. The Conservancy recently completed a national youth poll, which revealed that 82% of urban youth cite fear and discomfort as barriers preventing outdoor experiences, and 60% cite gangs and crime as barriers. Programs that fail to address these social factors will also fail to instill an environmental ethic in today's youth.

Figure 1. Example of relationships between social and ecological factors in urban systems.



space makes it more possible for people to engage in activities outdoors. These activities can improve urban residents' health. Other examples of such interrelationships in urban systems abound. Managing for healthy urban environments simply can't be done by focusing on one component to the exclusion of others.

Which Characteristics Are Most Important?

We identified the characteristics of healthy urban environments based on our interviews with 20 urban environmental educators. These people were all experts in urban environments, but they were a small group. We wanted to know whether their ideas about healthy cities resonated with others. For that reason, we conducted a survey with members of the North American Association for Environmental Education (NAAEE) and asked them what they thought healthy cities were like.

NAAEE members have expertise in environmental education, but they are not all experts in urban environments. Some live and work in cities, but others don't. Because of this, we were able to compare the perspectives of urban environmental educators with other educators with no special interest in urban areas. This approach

helped us to find out what was special or unique about the thinking of urban educators.

We used what we learned in the interviews to help design the survey, and so the set of characteristics we asked NAAEE members about were almost identical to the characteristics discussed during our interviews. The survey allowed us to rate how important environmental educators thought different characteristics of urban systems were. We calculated the mean perceived importance of each of these characteristics to a healthy urban environment (Figure 2). All 13 characteristics were, on average, perceived as moderately to very important. Clearly, as with the urban environmental educators we interviewed, NAAEE members considered both ecological and social factors important in cities. Some types of characteristics, however, were perceived as more important than others. Characteristics reflecting "people's relationship to the environment" (coded yellow) all tended to be perceived as relatively more important. "Characteristics of people," which were solely concerned with people and how they related to each other (coded orange), tended to be perceived as relatively less important.

We compared the perceived importance of these characteristics between educators

Figure 2. Mean importance of 13 characteristics of a healthy urban environment based on a survey of NAAEE members.

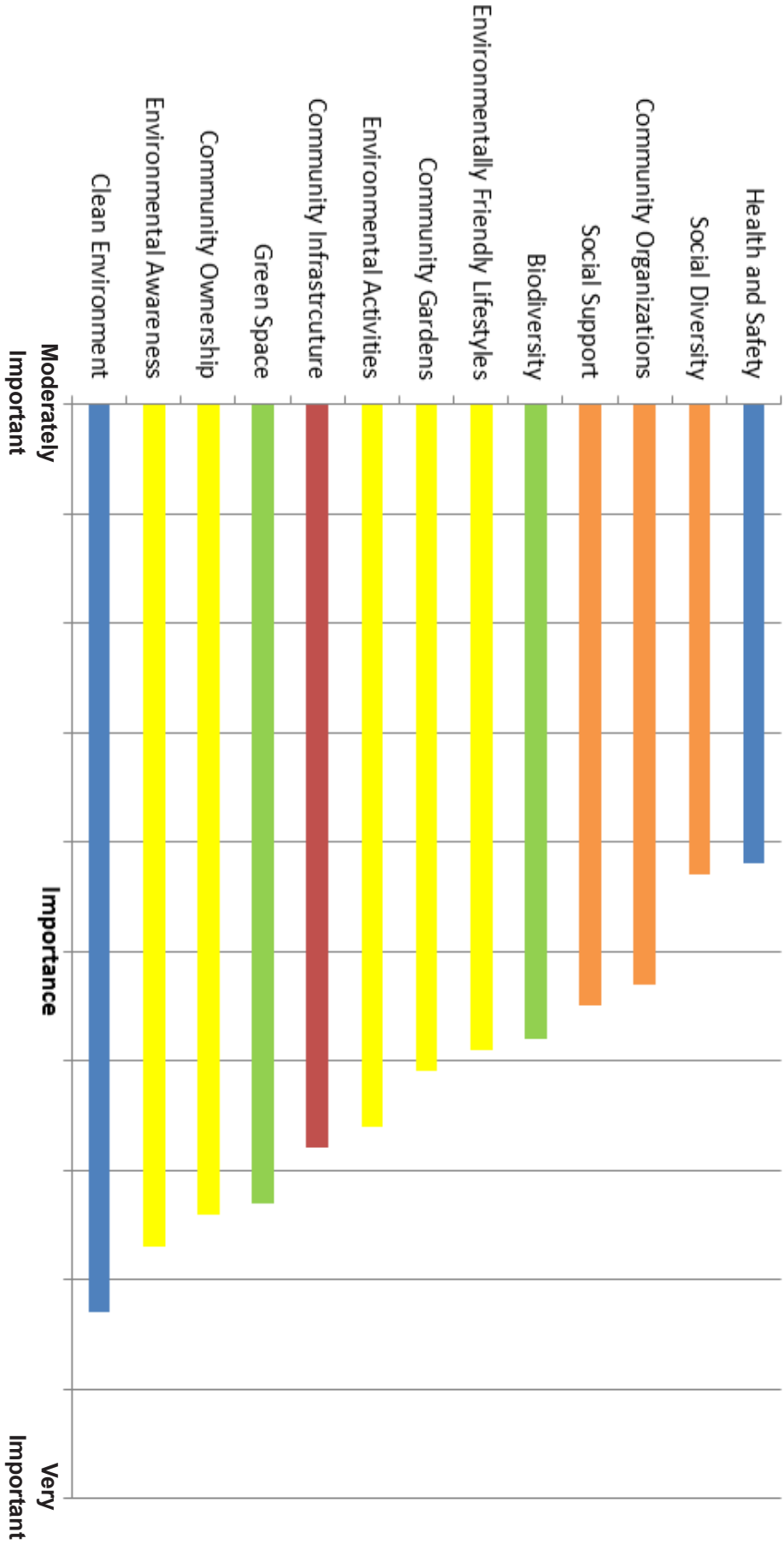


Figure 3. Mean importance of 13 characteristics of a healthy urban environment for NAAEE members with high interest in urban environmental education (upper bars) and low interest in urban environmental education (lower bars).

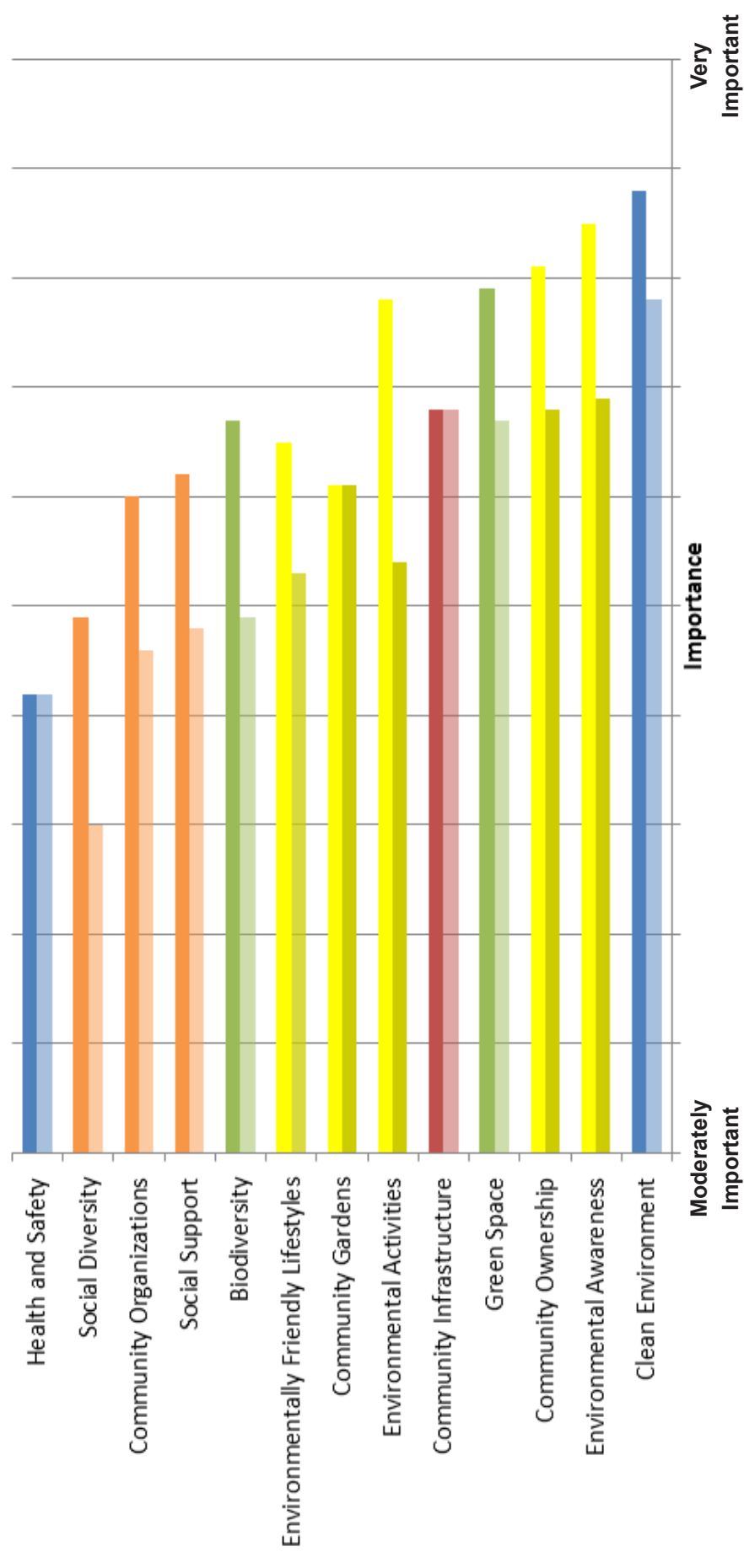
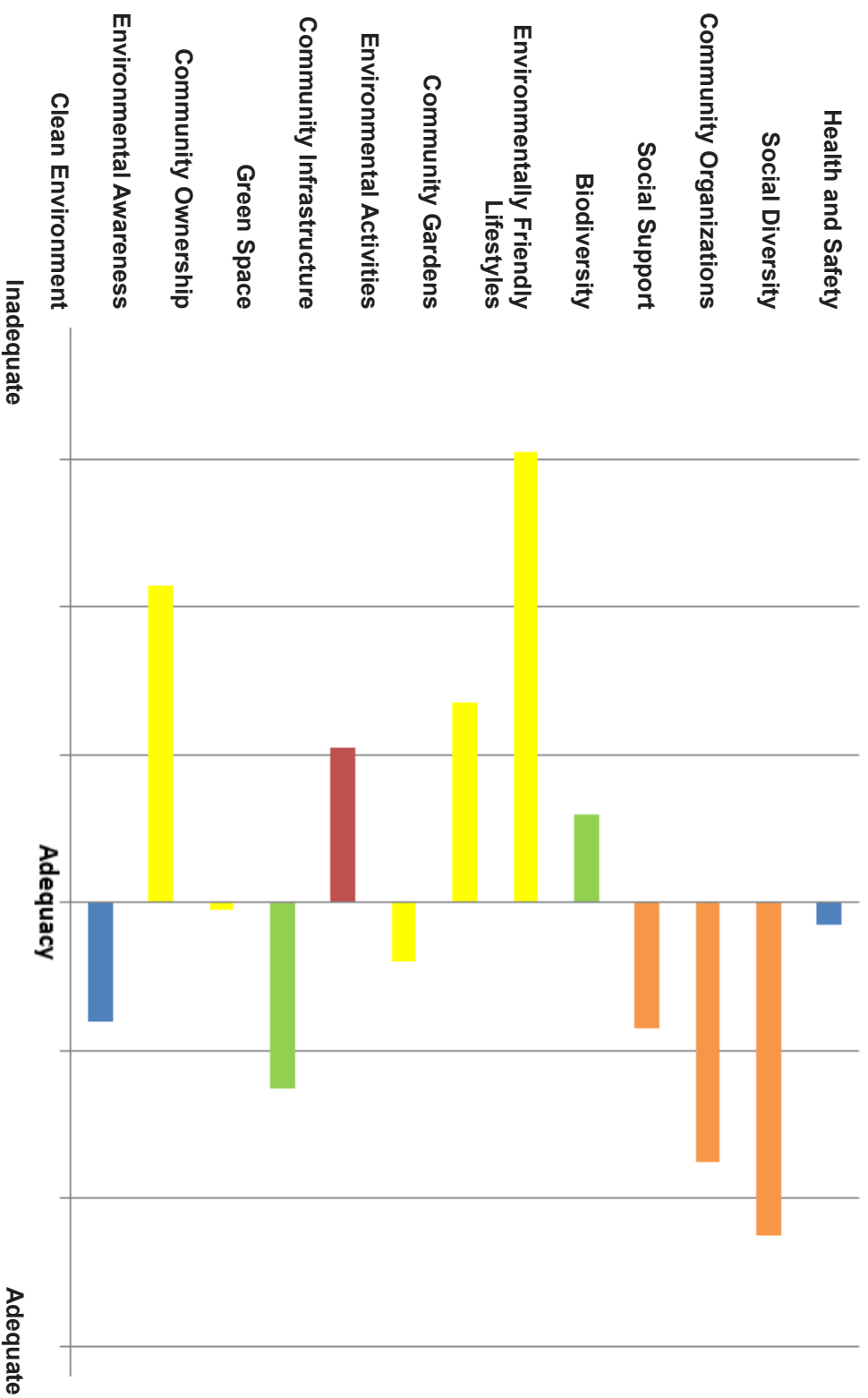


Figure 4. Mean adequacy of 13 characteristics of healthy urban environments for those with high interest in urban environmental education.



who were “not at all” or only “slightly” interested in urban environmental education with those who were “moderately” or “very” interested (Figure 3). Most characteristics were considered more important by educators with a strong interest in urban environmental education. When those most interested in urban environmental education were asked to rate the adequacy of cities with which they were familiar according to these 13 characteristics (Figure 4), the “characteristics of people” were more likely to be seen as adequate than many of the other characteristics of urban systems. “People’s relationship to the environment,” however, was more likely to be seen as lacking.

What does the survey tell us that the interviews did not? Like our interview respondents, our survey respondents tended to think both ecological and social characteristics of urban social-ecological systems were important. However, this group of environmental educators who had less of

an exclusive focus on urban communities somewhat deemphasized the importance of the social compared to the ecological. Some characteristics that were discussed frequently during the interviews – such as health and safety and social support – received relatively little emphasis among survey respondents. Those educators in the survey sample who had a keen interest in urban areas were more likely to see all of these characteristics as important. Furthermore, those interested in urban areas saw the social characteristics of cities as more adequate than other characteristics. What this tells us is that urban environmental educators – those with a strong focus on systems that have been heavily impacted by people – are more likely to recognize that social components and ecological components are both necessary in healthy urban environments, and they may even see the social characteristics as an area of strength within cities.

Designing Environmental Programs for Urban Areas

Having gained some understanding of the characteristics of healthy urban environments, we turn next to a discussion of how environmental education programs in cities might teach about healthy environments. We presented the results of our research to a group of 10 environmental educators from New York City during a one-day workshop. They shared stories about how their programs help to build healthy urban environments. Out of these discussions came a series of recommendations about how to run environmental education programs in cities. We summarize these recommendations here. They focus on two primary areas: program outcomes and program traits.

Environmental Education Outcomes

In our results, you read about a set of characteristics that educators thought that healthy urban systems should have. Ultimately, urban environmental education programs work to improve these characteristics of cities, but they tend to focus on some more than others. We present a list of those outcomes that educators believed it was both feasible and important to try to effect through education programs. Some of these are short-term outcomes – those that educators hope they will achieve by the time they finish working with a particular set of participants. Others are medium and long-term outcomes – those that educators hope their programs will ultimately contribute to at some point in the future.

Keep in mind that it is unlikely a single program would work toward all of these outcomes. Rather, this list represents a description of a wide range of outcomes that urban programs may try to achieve.

Short-term Outcomes

The shortest-term outcomes are generally those that environmental education

programs try to achieve with program participants during their involvement with the program. Many of these outcomes focused on environmental awareness, community ownership, social support, and community resources (particularly human resources).

Many environmental education programs attempt to increase awareness of and appreciation for urban environments. Outcomes of these programs may include:

- Broad understanding of the “environment.” It is important for urban residents to understand their environment has both ecological and social components. It is also important for them to recognize that the environment can be viewed at different geographic scales – from self to home to neighborhood to world.
- Awareness of the environment. Many programs work to improve the capacity to recognize diverse aspects of the environment, including both the ecological (e.g., ability to recognize urban wildlife) and the social (e.g., awareness of a variety of career options).
- Awareness of connections to the environment. This awareness may be cultivated on multiple levels, including recognition of oneself as part of the environment, feeling a connection to the environment, and recognition of one’s impacts on the environment.
- Environmental Appreciation. Urban programs often try to build appreciation (rather than fear) of nature and the recognition that green space is valuable in cities.

Urban programs often aim to take a step beyond awareness and appreciation, however. They also seek to cultivate a sense of responsibility toward the environment and advocacy on its behalf. Desired outcomes may include:

- A sense of responsibility toward the environment and the community.
- Support for programs that protect and enhance the environment.
- Environmental stewardship. Many programs hope to increase the number of people who work to restore, protect, and improve the environment (e.g., green space) and their communities.
- Advocacy and voting in support of the environment.

Because urban environmental educators conceive of the environment broadly, with both ecological and social components, they often aim for social outcomes as one part of their objectives. These outcomes may include:

- Improved social and communication skills in youth.
- Youth educating and having positive influences on other youth and family members.
- Youth making friends with youth from different schools and neighborhoods.
- Youth making connections with adults in professional settings.

Beyond social skills and connections, many programs hoped that their work would contribute to the capacity both of youths and the educators who worked with them. Specific outcomes targeted included:

- Youth recognition of their own strengths and capabilities.
- Improved academic results for youth.
- A broader conception of learning and more diverse approaches to teaching.
- Use of natural areas in teaching.

Medium-term Outcomes

Urban environmental education programs also hope to achieve outcomes that may not become apparent until after participants' involvement with their program ends. These medium-term outcomes were generally concerned with environmental activities, environmental friendly lifestyles, aesthetics, and health and safety.

Environmental education programs working with youth often provide them with new and different experiences with the environment. Many educators hope that these experiences will provide a foundation for continued outdoor and nature-focused recreation and experiences (e.g., birding or vacationing in natural areas) long after the program ends.

By instilling an appreciation of the environment and a recognition of connections between people and the environment, many programs hope to change behavior. These changes may include both a decrease in environmentally destructive behaviors (littering, excessive use of cars, etc.) and an increase in environmentally friendly behaviors (biking, earth-friendly consumerism, etc.).

Beyond trying not to harm the environment, past environmental education program participants may actively work to enhance its beauty. Because urban environments have a mixture of natural and built components, and these components are often intimately intermixed, efforts to cultivate the beauty of the environment can make an important contribution to the health of the social-ecological system.

As we discussed at length in our research results, educators view the ecological and social components of urban systems as being interrelated in numerous ways. They hope that many of the program outcomes we have already discussed, such as environmental awareness, environmental activities, and a sense of community ownership, will lead directly to other outcomes. These outcomes include:

- Improved physical, mental, and emotional health. Environmental activities and engagement with green space is good for people on a variety of levels. To the degree to which environmental education programs encourage this engagement, therefore, they can also be expected to contribute to human health.
- Appreciation of the environment and a sense of ownership towards it lead people to take care of it. This stewardship can make communities safer

because of a more positive community presence.

Long-term Outcomes

Through their programs, educators also hope to contribute to long-term outcomes that may not be apparent for years. These outcomes were generally concerned with the decisions communities make about how to invest their resources and the consequences of those decisions.

Educators hope that their work will lead to policies by government agencies and

nongovernmental organizations that lead to such outcomes as:

- The creation, restoration, stewardship, and use of healthy green spaces offering a variety of ecosystem services.
- An urban infrastructure that is designed to lessen the impact of people on the environment and enhance human health.

At an individual level, many also would like their work leading to a greater diversity of individuals working in environmental fields.

Box 4: Keys to Urban Environmental Education (Betsy Ukeritis, New York State Department of Environmental Conservation, New York City)

Vacant lots aren't and sidewalk cracks hold life!

Network! Network! Network!

15 minutes is better than none!

So what exactly do I mean by the above statements? I have been involved in environmental education for over fifteen years and the last nine have been in New York City, creating, doing, and administering the New York State Department of Environmental Conservation's NYC Environmental Education program.

Key 1: Vacant lots aren't and sidewalk cracks hold life

Yes, cities don't have large tracts of pristine "nature" outside every door, but that doesn't mean nature doesn't exist there. Street tree pits, sidewalk cracks, and even vacant lots hold life. And give kids magnifying glasses and they will find it! My point is: do not think just because you are not within two blocks of a park that you don't have an outdoor classroom.

Key 2: Network! Network! Network!

Just like location is key for a successful business, networking is critical for urban environmental education. Urban educators face considerable funding issues—so having contacts who might loan you resources is incredibly valuable. These resources could be presenters, curricula and activities, contacts at other organizations, or even 30 tree cookies for your class to learn about tree growth and dendrochronology. But your network is also vital to keep your spirits up and provide professional development opportunities. This support can be vital when data collection goes wrong, administration denies your field trip, or a parent complains that his kid came home covered in mud.

Key 3: 15 minutes is better than none!

Just because you only have 15 minutes to do a lesson or activity—or even to just get outside—that is still 15 minutes more than your kids would get without you. Time is a precious commodity in urban schools, even in after-school programs, so even if you can only schedule 15 minutes on Monday and Thursday: grab hold and do it! Yes, a 15-minute lesson is challenging to teach—but it is worth it to get the kids thinking about their environment and getting them outside!

Those are the big three, my advice to all new comers and old hands working at bringing environmental education to youth and adults in an urban setting.

Program Traits – Keys to Success

Based on their vision of what they hoped to accomplish through their environmental education programming, urban educators identified a variety of keys to the success of their programs. To begin with, educators maintained that the learning content of program activities should be emphasized, incorporating school standards and working with schools and teachers whenever feasible. They argued that it was best to take an interdisciplinary approach in which the environment is viewed from both an ecological and social perspective. Framing learning around simplistic right and wrong answers should be avoided.

A variety of recommendations were made about the types of activities in which youth should be engaged:

- Challenging (but safe!) program activities and new experiences were believed to be important. This type of activity can provide opportunities for participants to overcome their fears and build a sense of accomplishment.
- Activities should be fun, rely on experiential learning, and conducted outdoors whenever feasible.
- Multiple visits to the same sites can be valuable.
- Incorporating awards and incentives into activities can help to engage participants.
- Activities need to be designed to accommodate different learning styles. Flexibility in approach is needed for different individuals and situations.

Successful programs are also influenced by the characteristics of staff and how they interact with program participants.

- Staff need to be able to relate to participants, and this may be easier if staff characteristics reflect those of the community (with regard to age, language, race, etc.).
- All participants should be treated with kindness, respect, and warm regard.
- Staff should maintain an openness to all participants, and program activities should be inclusive of all.

- Desired behaviors with respect both to interactions with the environment and with other people should be modeled by staff.
- Many program participants can benefit by mentoring by program staff, if staff are in a position to provide it.

Although interactions between staff and participants are important, interactions between participants are equally important. Attention must be paid to building linkages among participants in successful programs. Having participants working together in groups, and encouraging participants to take leadership roles with their peers, can help to build these linkages.

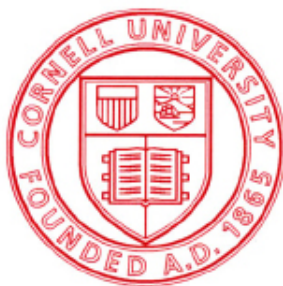
Ultimately, the success of urban environmental programs is determined in part by whom they are able to engage. Some participants face greater barriers to participation than others. Programs should be held at times and locations that make them as accessible as possible to target audiences. The costs of participating in a program can also reduce access, but asking participants to pay something can lead to greater commitment to participate in the program.

Conclusions

The approach to urban environmental education programming we advocate here, with a broad conception of what the “environment” means and an integrated approach to the environment in program activities, may be challenging to implement. But this work is important. Urban environments are just recently starting to receive a lot of attention from ecologists who are learning about how these systems function and how to better manage them for ecological and social outcomes. Urban environmental educators make important contributions to this work. Their thinking, based in an on-the-ground understanding of what it takes for urban environments to be healthy, helps us to better recognize what types of outcomes we may want to try to achieve. Their practice provides us with insights about how to achieve some of these outcomes.

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